ERGONOMIC ISSUES WITHIN A HEALTH CARE SETTING:

i) Resident Lifting and Handling Tasks

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RESIDENT LIFTING AND HANDLING TASKS

Low back pain is one of the most frequent ailments affecting people in their productive years (Andersson, 1981). For example, in 1985, back injuries represented 28 percent of all claims for lost-time injuries made to the Ontario Workers' Compensation Board. The Board paid $420 million to cover compensation and health care payments for back injury claims in the same year. With an average of 50 lost days per back injury claim, there were a total of 3.1 million work days lost in Ontario in 1985 as a direct result of back injury (Workers' Compensation Board of Ontario, 1986).

Health care workers have a particularly high incidence of low back pain and this has been related to the heavy physical demands of the work (Videman et al., 1984). For health care workers in Ontario, back injuries accounted for 44 percent of all lost time injuries in 1985. When the total number of lost time claims made by health care workers are analyzed by occupation, 28 percent of these claims are made by nursing aides and orderlies. Nurses account for 20 percent of claims made by health care workers and nursing assistants account for 11 percent (Health Care Occupational Health and Safety Association, 1986). Dehlin et al. (1976) attribute the extremely high risk of injury for nursing aides and orderlies with their direct involvement in the lifting and handling of residents and more specifically with lifting with the trunk flexed forward.

LIFT AND TRANSFER TECHNIQUES

There are several variables which combine to influence the physical demands of work tasks which involve the lifting and handling of loads. The specific characteristics of the load which contribute to the task demands include the actual weight being lifted, the weight distribution and stability of the load, the size and shape of the load, the coupling

between the worker and the load (e.g. hand grip), the initial and final vertical location of the load and any significant horizontal distances the load is moved through. When the load is a resident then some of the above parameters are not as easily defined as when lifting a box full of supplies. Other variables which influence the physical demands of the task are the position of the load relative to the worker's body, the stability of the worker, and the physical constraints of the work area which may restrict the worker's body posture. The duration of the task and the frequency with which it is performed further influence the physical demands placed on the worker.

Load Variables

The load weight is one of the most important variables contributing to the physical demands of a lifting or handling task. The physical size and shape, or bulk of the load also contribute to the physical demands of the work task.

When lifting and handling residents, the stability of the load is often unpredictable. It is important that both the worker and resident are fully prepared before beginning the lift or transfer. The furniture and aids used in a transfer (e.g. bed and wheelchair) should be secured to prevent unanticipated movement. Workers should try to anticipate sudden changes in the resident's ability to assist, body posture, and movement patterns. If unpredictable resident action results in the worker having to support more weight than they can safely handle, then it may be necessary to slowly lower the resident, even to the floor if necessary, in order to avoid injury to the worker and/or resident.

Biomechanical Variables

The position of the load relative to the worker's body is a very important factor in determining the physical demands of a lift or transfer task. Ideally, the weight should be supported between the knee and shoulder height of the worker. Lifting below knee height or above shoulder height is very physically demanding. Simply adjusting the height of the bed may enable the worker to adopt a more comfortable work posture and also minimize the vertical component of the lift or transfer. The load should also be kept as close to the worker's body as possible. The further the load's center of mass is from the worker's body then the greater the muscle exertion required when lifting and the greater the risk of injury to the worker. Therefore the horizontal distances involved in the lift or transfer must also be minimized.

Whenever possible, the worker should lift with the load directly in front of their body (i.e. symmetrically). It is generally believed that asymmetric lifting (e.g. when a load is lifted at the side of the body) is more hazardous to the musculoskeletal system than symmetric lifting due to the combined effects of flexion, lateral flexion, and the accompanying axial rotation of the spine. The resulting asymmetric loading of the back muscles is likely to result in higher local stress concentrations on the spine which may put the worker at greater risk of injury (Kumar, 1984). Further, asymmetric lifting can cause poor postural stability. Workers should be encouraged to move their feet to keep the load in front of their body, rather than lifting while twisting at the waist.

The worker's initial posture and stability are very important when lifting or transferring a resident. To minimize the physical demands on the worker, equipment or furniture should be moved to permit the worker to adopt an

unrestricted body posture. The workspace may also have to be rearranged to permit the use of a mechanical aid or assist. Female staff involved in a lot of resident handling tasks may find that wearing slacks permits a more unrestricted body posture than some of the more traditional dress uniforms. Proper shoes will help ensure that secure footing is maintained throughout the lift.

Worker Variables

The physical size and body dimensions of an individual can influence the biomechanics of a lifting task. An extremely tall individual, for example, may be able to easily lift a heavy box from a shelf which is above the shoulder height of a shorter worker. Within a worker population of women and men, there is an extremely large range of body sizes and shapes. Muscle strength also varies significantly within the worker population, with male workers as a group generally being physically stronger than female workers. However, there is considerable overlap in strength between the strongest females and the weakest males. The endurance of an individual worker is also an important variable when examining physically demanding work tasks. Muscle fatigue reduces an individual's ability to perform heavy lifting. Both physical strength and endurance capability can, however, be increased if a worker is trained and regularly exposed to physically demanding work. Muscle strain and other injuries can reduce a worker's ability to perform physically demanding tasks.

Taking into account the full range of physical abilities within the worker population, criteria should be developed to ensure that the load lifted or transferred does not put the worker at undue risk of injury. If the lift or transfer is too physically demanding, then two or more workers should be involved and/or an appropriate mechanical lifting aid should be used to support some or all of the weight.

Lift and Transfer Aids and Assists

Various types of mechanical aids and assists are available to make the manual lifting and handling of residents less physically demanding for the workers. The mechanical lifts typically support the full weight of the resident. Transfer aids or assists can be used to: support a portion of the resident's weight; make supporting the weight easier; and/or eliminate a portion of the movement or undesirable work actions.

Many facilities use wide "lifting belts" to make it easier for staff to lift or transfer residents. The types of belts used range from standard vehicle seat belts to broad bands of tightly woven material fastened with velcro. The worker places a belt around the resident's waist and then grips opposite sides of the belt when performing the lift or transfer. When lifting a resident, these belts enable the worker to get a secure hand grip and as a result have better control of the resident. As the belt is positioned at a reasonable height for most workers and is also close to the resident's centre of gravity, it also helps to keep the load close to the worker's body.

Transfer boards are often used when assisting a resident into a car or in other situations where a resident must be moved in a lateral direction. Having a number of boards of different widths and lengths will accommodate the different physical dimensions of the specific areas in which they are used. Another very useful assist is a transfer disk (turntable) which allows the worker to pivot the resident. A transfer disk eliminates those situations where a worker might twist at the waist while supporting the weight of the resident.

Various types of slings are useful for some two-person lifts or transfers and can also be used to supplement the standard

slings that are provided with mechanical lifting aids. Often the standard slings do not give the required stability for all residents, especially if muscle spasm or amputation interferes with the resident's balance or posture. Some slings may also restrict blood flow and contribute to skin breakdown. In these instances it may be useful to make new slings or modify existing slings with sheepskin covers etc. to eliminate some of these problems. In some facilities, the occupational therapy, laundry, workshop, or maintenance areas can actually make or modify lift and transfer aids. This allows the additional flexibility of custom designing aids or assists to meet a specific need.

Furniture and other components of a room can also be designed to assist staff when moving residents. One of the more standard "hospital" adaptations is the use of an overbed trapeze which allows residents to shift their weight and change body position while in bed. Other typical hospital design features include the provision of hand rails and grab bars. More asthetically acceptable, but equally functional assists include the placement of well secured shelves and dressers which the resident can use to help them stand. For residents with good upper body strength, well positioned pull cords securely fastened to the wall can allow some individuals to pull themselves up into a standing position where they can then support themselves using a walker or other mobility aid. Beds which are height adjustable, drop sides on beds, removable arms on wheelchairs etc. can further assist the worker by minimizing the physical demands of the lift or transfer. Chairs of different heights, commode chairs, roll in showers, pedestal tubs and other special tub designs, shower seats etc. can further assist the worker by limiting either the number or the physical demands of lifts and transfers.

A wide variety of mechanical lifts are commercially available to support all, or a portion of, the resident's

weight during a lift or transfer. Some of these aids are specifically designed for bathing of residents and are used with specific types of tubs. Staff should ensure that the particular aid or equipment used for a lift or transfer is suited to both the individual resident's physical capabilities and medical status. In addition, it is important that the mechanical lift be physically compatible with the work area where it is to be used. For example, there must be adequate clearance under the bed or tub and enough clear area to allow the worker to manouever the aid into position.

Specific Techniques

Although resident care and safety is the primary concern in health care facilities, this can only be assured if the staff ensure their own safety. Situations may arise, for example, where staff are properly executing the designated lift or transfer and at the midway point of the movement, some unplanned resident action or other variable makes the transfer impossible to complete. In such scenarios, it is critical that the established procedures allow for controlled lowering of the resident - even to the floor, if necessary. This acts to minimize the risk to both the resident and worker by allowing the worker to call for assistance or reposition and establish control to perform the lift safely.

Most situations involving the physical lifting and handling of residents are not immediate and critical emergencies. However "urgent" situations can arise where there is only one worker available to lift a resident who requires a two-person lift. The various options in this type of situation should be thoroughly discussed with all staff. It should be reinforced that the safety of both the resident and the worker may be compromised if the worker attempts this lift alone. Assuming that it is not possible to get immediate

assistance, the staff person can leave the resident and attempt to get help. There may be specific consequences of failing to lift the resident immediately. However, there are also potential consequences if the worker attempts to lift the resident alone. The worker may: (1) be completely unable to lift the resident, (2) unsuccessfully attempt a lift and risk injury to the lifter and/or resident, or (3) with great physical strain, successfully complete the lift. The lifting procedures should address these scenarios and give workers firm guidelines about how to deal with these situations.

Before attempting a lift or transfer the worker must first assess the situation and determine the specific lifting technique that should be used. The worker should then make the necessary adjustments to the height and position of equipment and furniture, and prepare the resident for the lift. Where possible, the resident should be encouraged to assist with the lift or transfer. For example, in some paralyzed residents, existing muscle spasm can be used to actually minimize the body weight that the worker must support during a transfer. Hemiplegic residents transferring from a bed to a wheelchair can often assist the worker by weight bearing on their unaffected side. If the bed height is lowered and one arm of the wheelchair is temporarily removed these residents may need only minimal assistance. Although making these adjustments takes some additional time, this can greatly reduce the physical demands placed on the worker. Once the equipment, work area, and resident have been adequately prepared, workers must ensure that their own body posture is correct and that they have secure footing before beginning the lift or transfer.

Many resident lifts and transfers require the involvement of more than one worker. In these situations, proper coordination between the workers involved will reduce the

physical effort required. One of the workers should act as a leader to direct the lift sequence and timing. The weight of the load should be evenly distributed between the workers.

A multidisciplinary team is often in the best position to develop procedures for lifting and handling residents. Creative input from ward supervisors, nurses, nursing assistants, orderlies, physicians, physiotherapists, occupational therapists, and back education staff will help ensure that the methods adopted combine the best of technology and practical considerations. Directly involving the workers who perform most of the lifting and handling tasks will also help promote compliance with formal procedures.

Written Procedures

Detailed procedures should be developed to cover all potential lift and transfer scenarios. They should include methods for turning and repositioning, bathing, toiletting, dressing, administering treatments, transferring to cars or vans, and fire or other emergency situations. Depending on the physical size, abilities, and medical status of the resident, the staff role in these situations can range from giving verbal or moral support, to stabilizing furniture involved in a transfer, through to operating a mechanical lift or acting as a member of a team involved in a full manual lift. Residents with different physical abilities and medical conditions should be considered when developing a set of standard lift and transfer procedures. Although it is difficult to be exhaustive when developing specific techniques, it is important to have a basic core of lift and transfer methods that can be added to or modified as required. As many of the physical components of resident handling tasks cannot be changed, it is often necessary to

limit the frequency and duration of these activities. The physical demands can often be kept to acceptable levels by regularly rotating staff between the physically demanding resident lifting and handling tasks and other less demanding work tasks.

Standard procedures for all lifts and transfers should be well documented in a written procedure manual. Direct communication of these procedures through on-the-job training is important but cannot eliminate the need for formal written procedures. Although most health care facilities have procedure manuals, staff often view them as an administrative necessity rather than a practical working tool. Often photocopies of the manufacturer's sales brochures on mechanical lifts are the only material in the manual's section on mechanical lifting devices. This is not adequate. The manual should have many illustrations or pictures to ensure that specific techniques can be reviewed using either the illustrations and/or the written description. The procedure manuals should be readily available on each ward and it is often useful to post specific pages for quick reference in specific work areas.

Systematic revision of lift and transfer procedures should begin with the lifts or transfers identified as inappropriate or not practical to use within the existing ward routines. Specific techniques associated with high numbers of incidents or injuries should also receive priority in the updating process. Staff involvement in the updating procedure promotes improved knowledge of existing procedures and development of practical alternatives based on direct work experience. Workers should be encouraged to identify parts of the manual which may need clarification or additional illustrations. One approach to revision of procedures involves all ward staff focusing on a specific lift or transfer procedure for a two-week period using a team problem-solving effort to develop alternatives. When

this system is used within each ward, an informal creative competition between wards can help to generate additional interest. This type of active participation by the workers helps ensure that the reviewed procedures are usable and thus promotes adherence to the established techniques.

RESIDENT ASSESSMENT

Most health care facilities use a "resident care plan" or a similar method to document pertinent medical information on each resident. Although it is typically the RN or RNA who is responsible for updating this information, other health care staff also have access to the resident care plans. When workers are physically lifting and handling residents, the resident care plan should specify the exact procedures to be used.

A multidisciplinary team is best able to assess the capabilities of each resident and determine the lift and transfer techniques that are required. Potential team members include ward supervisors, nurses, doctors, aids or orderlies, physiotherapists/occupational therapists, back education staff, and even maintenance workers. The varied backgrounds, work experience, and unique perspectives of these individuals can combine to determine the best way to move the resident. As the safety of the resident is only ensured if the workers are not at risk of injury, the team should determine the methods that are best for the resident yet minimize the physical demands on the staff.

Although each resident may have specific lift or transfer techniques listed on their resident care plan, it is important that this information be readily available to all ward staff. Staff often report that they do not have time or do not take the time to read the resident care plans. Given this reality, critical lift or transfer information

must be translated to a readily accessible and easily interpreted form. Situations involving high resident turnover, frequent rotation of staff between wards, or temporary assignments to cover employee absence, make it even more important to have this information readily available to the workers.

There are many ways of presenting essential lift and transfer information so it can be readily accessible to the workers. Some facilities use "line-o-vision" colour coding on the wall above the resident's bed. Coloured stick-on dots then indicate the resident's lift or transfer status. Ideally the code should be designed so that even employees with defective colour vision can quickly decipher the code. For example, all lifts requiring two staff could be indicated using overlapping dots. Another colour and size of dot could be used to indicate potentially aggressive or violent residents. This information can be coded in the same way on wrist bands or on the mobility aids of the residents. Wool pompoms fastened to the end of the resident's pull cords used to alert the nursing station can serve the dual purpose of being coded to indicate the resident's lift or transfer status yet also make it easier for the resident to grasp the small end of the cord. Other features of the resident's room decor can also be coded if it is important to have an unobtrusive way of providing the staff with the essential information.

All staff should be personally responsible for immediately notifying their supervisor about any problems with performing the required lift or transfer, or any changes in the resident's health that may influence this status. This resident should then be quickly reassessed and the lift/transfer code changed if necessary. In situations of temporary illness for example, a thin line could be put across the row of dots on the "line-o-vision" to indicate that caution should be used when performing the coded lifts.

Equally important is the information that is passed on to ward staff following a shift change. Often staff do not have the training to translate the medical terminology used in these communications into practical information about how to lift or handle the individual. Supervisors must ensure that this very essential information is provided.

EDUCATION

Education is an essential part of any effort to reduce incidents and injuries related to the physical lifting and handling of residents. This effort should involve all staff and include promoting an awareness of general safety, formal back education, fitness and back exercise programs, ongoing in-service training, and instructional sessions on lift or transfer techniques. The Joint Health and Safety Committee is often in an ideal position to promote a cooperative venture with the support and active involvement of both management and workers. It is essential that the educational effort be ongoing with frequent refresher sessions, rather than just involving formal training programs that are repeated once a year.

Staff are often totally unaware of the extent of a health or safety problem. The need to work safely could be reinforced by regularly making staff aware of the extent of various types of injuries on the ward. One method of increasing awareness could involve injured workers acting out their injury scenario with their colleagues and then discussing specific ways of preventing this type of injury. Workers are very receptive to learning from their peers, rather than receiving all their instruction from supervisors.

Special back education sessions are often useful in facilities where there is a high incidence of back injuries or a lot of physically demanding work involving lifting and

carrying tasks. If the trainer has been involved with injury investigations or has been a part of the resident assessment process, then this practical input will help ensure that the principles taught, and examples used, are relevant to the workers. Input from both workers and management is invaluable when developing these sessions. Class participants should evaluate the formal training sessions to help identify the focus for any course revision or updating. Safety training should become a part of the orientation given to all new employees.

In-service training is often the most useful way of providing ongoing and job-specific education. Employees often learn a new job best by working alongside an experienced staff member for a few days. Within a ward it may be useful to have an "issue of the week" where all staff review, for example, methods of bathing residents in the century tub room. Short sessions during the week would then involve demonstrations and then practice of the formal lift or transfer procedures. These sessions are good opportunities for staff to bring up questions about the formal procedures or the appropriateness of the lift or transfer procedure designated for a specific resident.

If staff do not routinely use lifting equipment, they may forget the exact procedure or lose confidence about using an aid. The manufacturers or suppliers of the various aids and assists may be able to provide frequent refresher training for ward staff. Where a lift or transfer method has been adapted, e.g. - using modified slings with a mechanical lift, all staff should be specifically instructed in this procedure.

The lifting and handling of aggressive or violent residents can lead to additional risks to staff. If workers are routinely involved with aggressive or violent residents, then specific training should be provided on this type of scenario. These sessions should focus on specific techniques that have been developed to minimize the risk of injury for both the worker and resident.

INCIDENT AND INJURY DATA

Detailed recording of all incidents and injuries nvolving resident lifts and transfers is an integral part of any injury prevention program. The reports might include personal information on the worker such as height, weight, training, staff position, relevant details of footwear or clothing, training, and length of employment. Other data that could be recorded include shift and exact time of the injury, length of time since last work break, recent absences due to illness, layoff, or vacation. The reports should note details such as staff shortages due to illness, or the presence of new staff on the ward, to help identify if the incident was related to inadequate staffing. Some details about the resident which may also be useful include their height and weight, current lift or transfer status, and any complicating factors such as unanticipated aggression or sudden change in medical status. Analysis of these data might help identify situations where specific characteristics of the resident contributed to the problem or where one resident is involved in multiple incidents or injuries. The exact location of the incident or injury, details of the equipment and work area involved, and relevant interactions between the equipment, worker, resident and work area should also be noted.

Following an incident or injury, the supervisor should review the specific situation with the worker(s) involved and make written recommendations for future action. The worker involved should take refresher training if the event involved the use of improper procedures. It may also be useful to have the worker review the scenario with their colleagues during a short in-service training session.

It is very important that the injury and incident statistics are reviewed on a regular basis in order to identify high risk scenarios. As sick time is often the result of fatigue

or muscle discomfort related to the work task, it is useful to review this data in conjunction with the injury and incident reports. Supervisors on each ward should receive monthly updates which compare the status of their staff with other areas within the facility. The Joint Health and Safety Committee should be actively involved in reviewing this data and recommending additional training or prevention strategies.

MAINTENANCE

Routine maintenance of all wheelchairs, commode chairs, other lift and transfer aids, beds, carts etc. is a very important part of injury prevention. All wheels and moving parts should be regularly checked and where necessary lubricated to ensure that they move smoothly and do not require the worker to use unnecessary force. These checks should also include the brake mechanisms of chairs and beds. A regular maintenance program can prevent unnecessary injury to residents, housekeeping staff, and even therapy staff in addition to the benefits for nursing staff. Any staff member identifying a maintenance problem should follow a well established procedure to quickly notify maintenance and have the situation remedied within a satisfactory period of time. In some facilities it has been worthwhile to train a couple of workers on each ward in basic repair and routine maintenance. This enables some of the more simple maintenance duties to be performed on the ward.

PURCHASING

Purchasing departments should involve the staff in determining the specifications for new purchases that are to be used in their work areas. As an example, the various workers involved with the resident beds may have the following specific concerns. Nursing staff will want to ensure that the new beds have sufficient clearance

underneath to permit the use of mechanical lifting aids. Workers who routinely make up the beds may have a concern about beds with attached sides that do not swing down below the bottom of the mattress. Purchasing staff may also not be aware of the difficulty of operating the mechanical controls used to adjust the height and position of resident beds. Liaison with the ward staff may indicate the need to purchase a few beds with hydraulic control mechanisms that can be used for residents who must frequently have their bed controls adjusted. Nursing and housekeeping staff who may have to move the beds may also be concerned about the brake mechanism on the wheels. Implications for the maintenance staff should also be considered.

Very often it is useful to obtain a single lift or piece of equipment on trial to see if it is useful in a specific situation. Where possible the suppliers should also be encouraged to provide mini-training sessions for staff on use, maintenance, cleaning, and the availability of new aids and assists.

REFERENCES

Andersson, G.B.J., 1981, Epidemiologic aspects of low-back pain in industry. Spine, 6, 53-60.

Dehlin, O., Hedenrud, B., and Horal, J., 1976, Back symptoms in nursing aides in a geriatric hospital. Scandinavian Journal of Rehabilitation Medicine, 8, 47-53.

Health Care Occupational Health and Safety Association, 1986, Workers' compensation board 1985 injury statistics for rate 882.

Kumar, S., 1984, The physiological cost of three different methods of lifting in sagittal and lateral planes. Ergonomics, 27, 425-433.

Videman, I., Nurminen, T., Tola, S., Kuorinka, I., Vanharanta, H., and Troup, J.D.G., 1984, Low-back pain in nurses and some loading factors of work. Spine, 9, 400-404.

Workers' Compensation Board of Ontario, 1986, Compensation statistics for 1985.